ATTACHMENT A

Phthalate Exposures Based on CDC National Exposure Report

Phthalate	Urine Concentration[a] µg/g creatinine		Exposure[b] µg/kg/day		Prior exposure est.[c] µg/kg/day	RfD[d] ug/kg/day
	Geo. Mean	90th %ile[e]	Geo. mean	90th %ile[e]		
DEP	151.5	892 (1400[f])	**5.42**	31.90 (50.06[f])	**57**	**800**
DBP	23.0	69.0 (93.0)	**0.90**	2.70 (3.64)	**2-10**	**100**
BBP	15.0	57.5 (72.7)	**0.66**	2.52 (3.18)	**2-6**	**200**
DEHP	2.8[g]	9.1 (11.2)	**0.65[g]**	2.13 (2.62)	**3-30**	**20**
DINP	<LOD[g]	3.8 (12.1)	**<LOD[g]**	0.91 (2.89)	**below 3-30**	**120[h]**

a. Concentration of monoester of the associated phthalate detected in urine, corrected for urinary creatinine, as reported by CDC at www.cdc.gov/nceh/dls/report.

b. The urinary concentrations were converted to daily intake using the methodology described in David, R. (2000). Exposure to phthalate esters. *Environmental Health Perspectives* 108(10):A440. The values given by this methodology are very similar to values derived by a separate methodology used by the CDC and the National Institute for Environmental Health Sciences. Kohn, M., et al. (2000). Human exposure estimates for phthalates. *Environmental Health Perspectives* 108(10):A440-442. Note, however, that the conversion equation in the David article was incorrectly formatted. The correct equation is as follows:

$$\text{daily intake}\left(\mu\text{g/kg/day}\right)=\left(\frac{\text{urine conc.}\left(\mu\text{g/g creatinine}\right)\times\text{creatinine excretion}\left(\text{g/kg/day}\right)\times\text{mol wt diester}\left(\text{g/mol}\right)}{\text{mol w. monoester}\left(\text{g/mol}\right)\times\left(\frac{\text{mol monoester in urine}}{\text{mol diester ingested}}\right)}\right)$$

The value used for creatinine excretion was 0.020 g/kg/day (*see* Tietz, M., ed. (1986). *Textbook of Clinical Chemistry*. W.B. Saunders Co., Philadelphia, PA, p. 1821.) Values for the ratio of monoester in urine to diester ingested were taken from Anderson, W. Castle, L., Scotter, M., Massey, R. and Springall, C. (2001). A biomarker approach to measuring human dietary exposure to certain phthalate diesters. *Food Additives & Contaminants*, in press (accepted Jan. 5, 2001).

c. With the exception of DEP, these are estimates of exposure to the general population by the Expert Panel of the National Toxicology Program Center for the Evaluation of Risks to Human Reproduction (CERHR) reported in their October 2000 final reports, available at http://cerhr.niehs.nih.gov/news/index.html. The CERHR Expert Panel did not evaluate DEP. The Agency for Toxic Substances and Disease Registry (ATSDR) has estimated that daily exposure to DEP is 4 mg/person, which translates to 57 µg/kg/day for a 70 kg person. ATSDR (1995). *Toxicological Profile for Diethyl Phthalate*. U.S. Department of Human Health Services.

d. From the Integrated Risk Information System (IRIS) database maintained by the US Environmental Protection Agency (www.epa.gov/ngispgm3/iris).

e. The 90th percentile value reported by the CDC. The value in parentheses is the upper end of the 95th percent confidence interval reported by the CDC.

f. By comparison to other values in the CDC table, the value of 1400 for the upper end of the 95th percent confidence level appears somewhat too high apparently from mathematical error. Thus, the corresponding calculated exposure also would be somewhat too high.

g. CDC did not report a geometric mean (presumably because of the large number of samples that were less than the level of detection (<LOD)). The value given in the table is the 50^{th} percentile value.

h. EPA has not developed an RfD for DINP. The value given is the Acceptable Daily Dose from Report to the US Consumer Product Safety Commission by the Chronic Hazard Advisory Panel on Diisononyl Phthalate (DINP), June 2001 (available at http://www.cpsc.gov/LIBRARY/FOIA/Foia01/os/dinp.pdf).